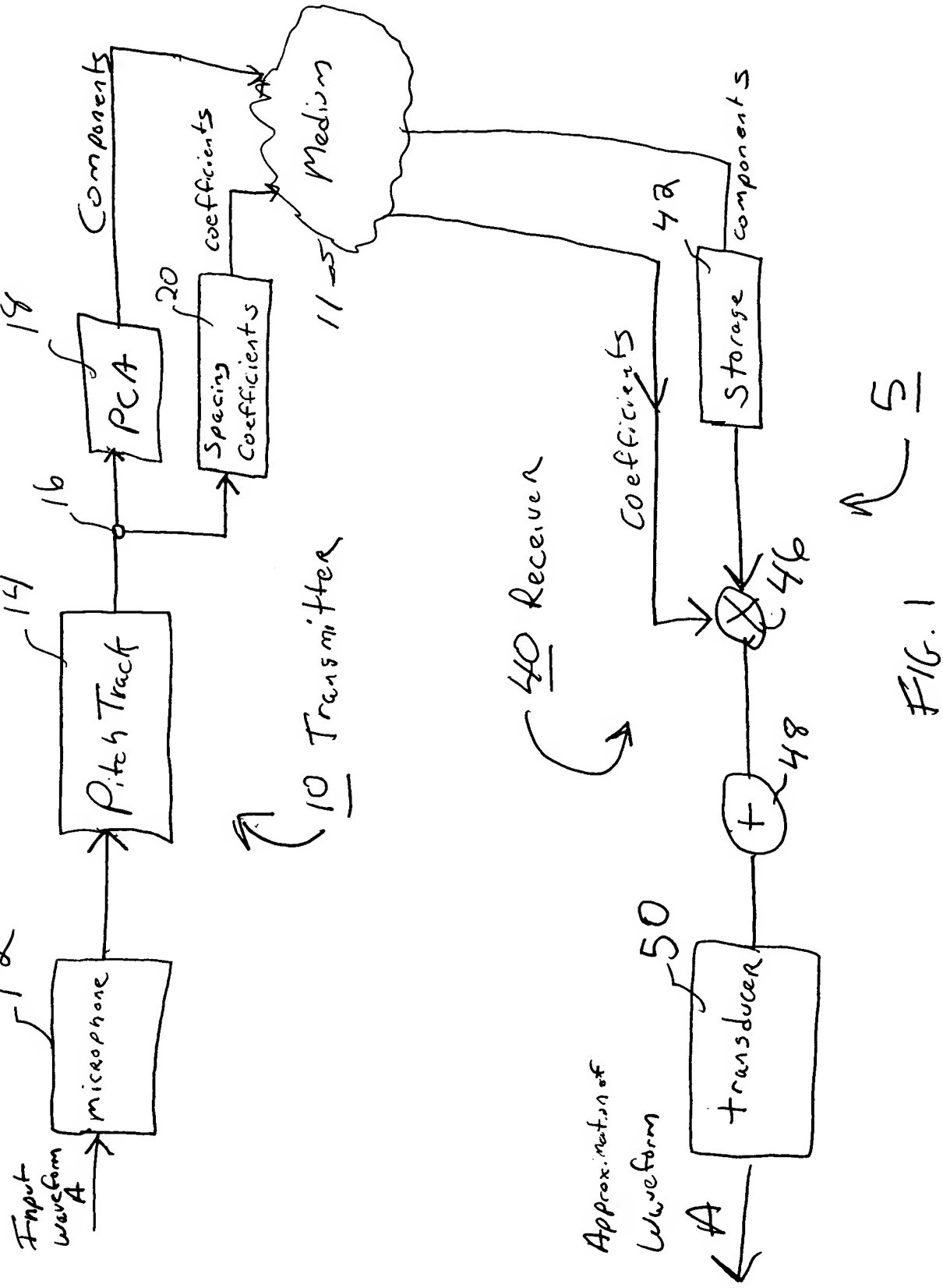

Input waveform A
12
microphone
14
Pitch Track
16
18
PCA
components
20
Spacing Coefficients
coefficients
10 Transmitter
11
Medium
40 Receiver
Coefficients
42
Storage
components
46
48
50
transducer
Approximation of waveform A
5

FIG. 1

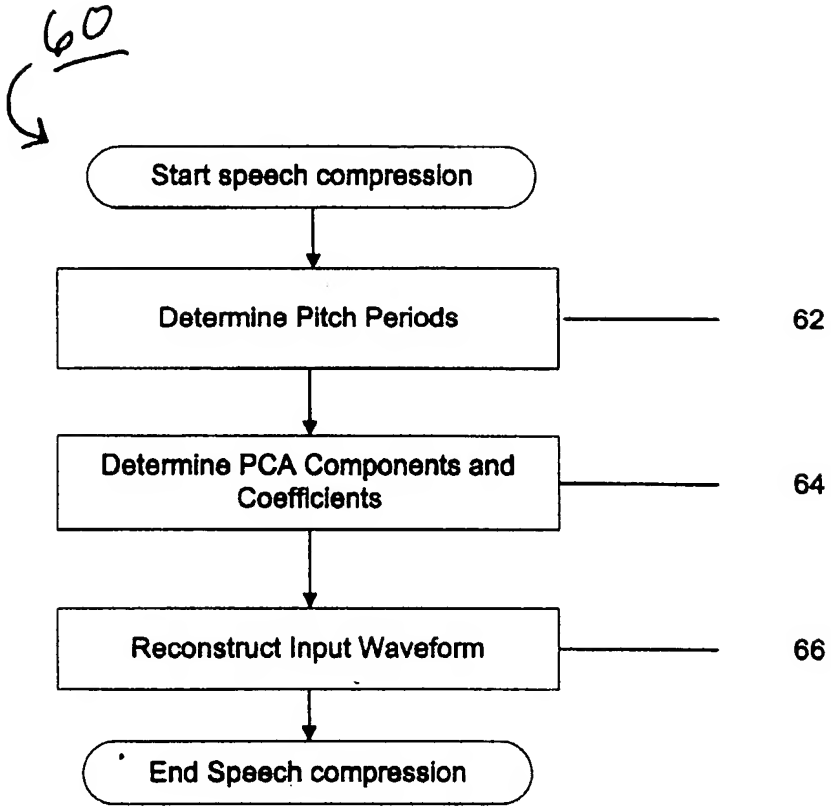

60
Start speech compression
Determine Pitch Periods
62
Determine PCA Components and Coefficients
64
Reconstruct Input Waveform
66
End Speech compression

FIG. 2

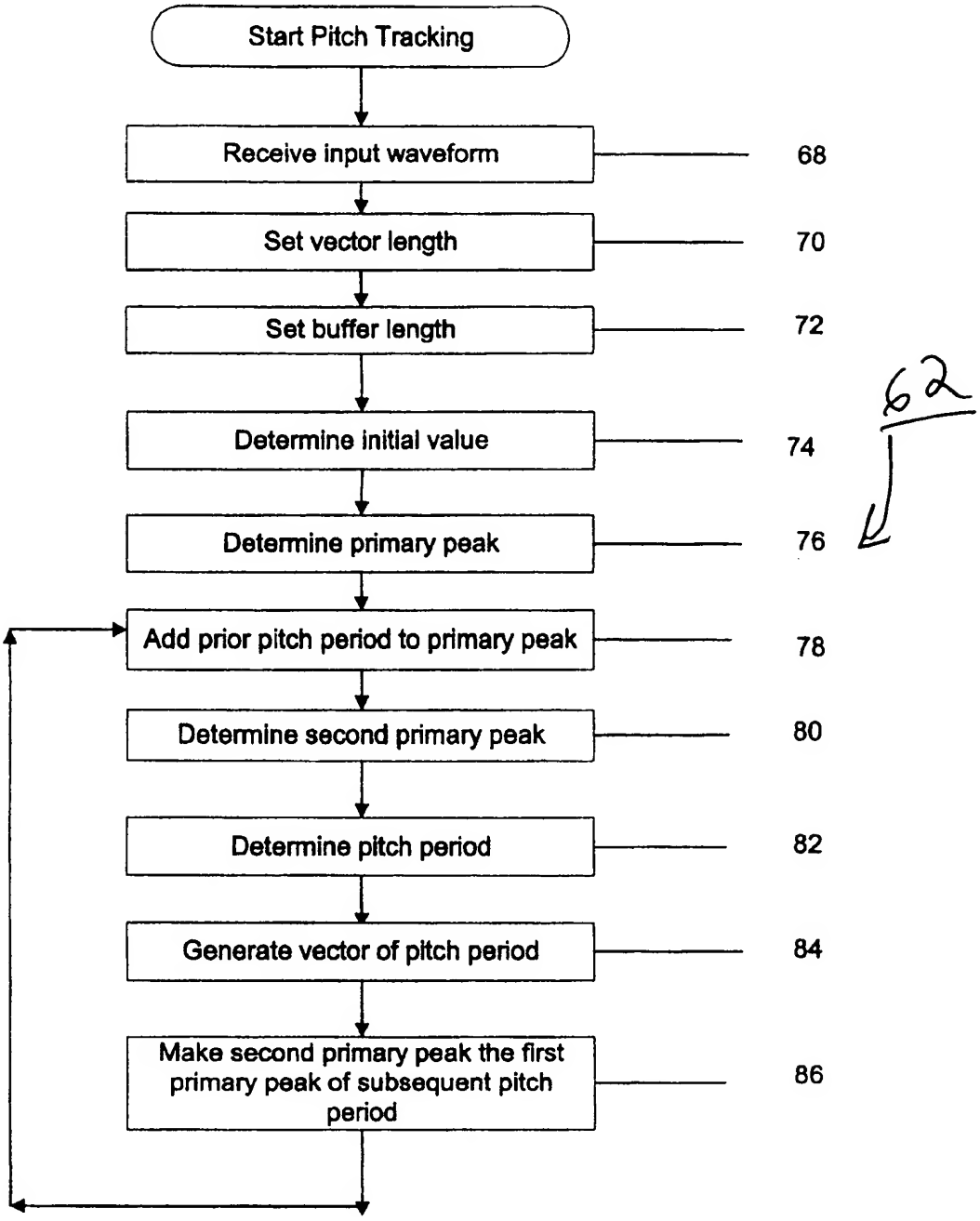

Start Pitch Tracking
Receive input waveform
68
Set vector length
70
Set buffer length
72
Determine initial value
74
Determine primary peak
76
Add prior pitch period to primary peak
78
Determine second primary peak
80
Determine pitch period
82
Generate vector of pitch period
84
Make second primary peak the first primary peak of subsequent pitch period
86
62

FIG. 3

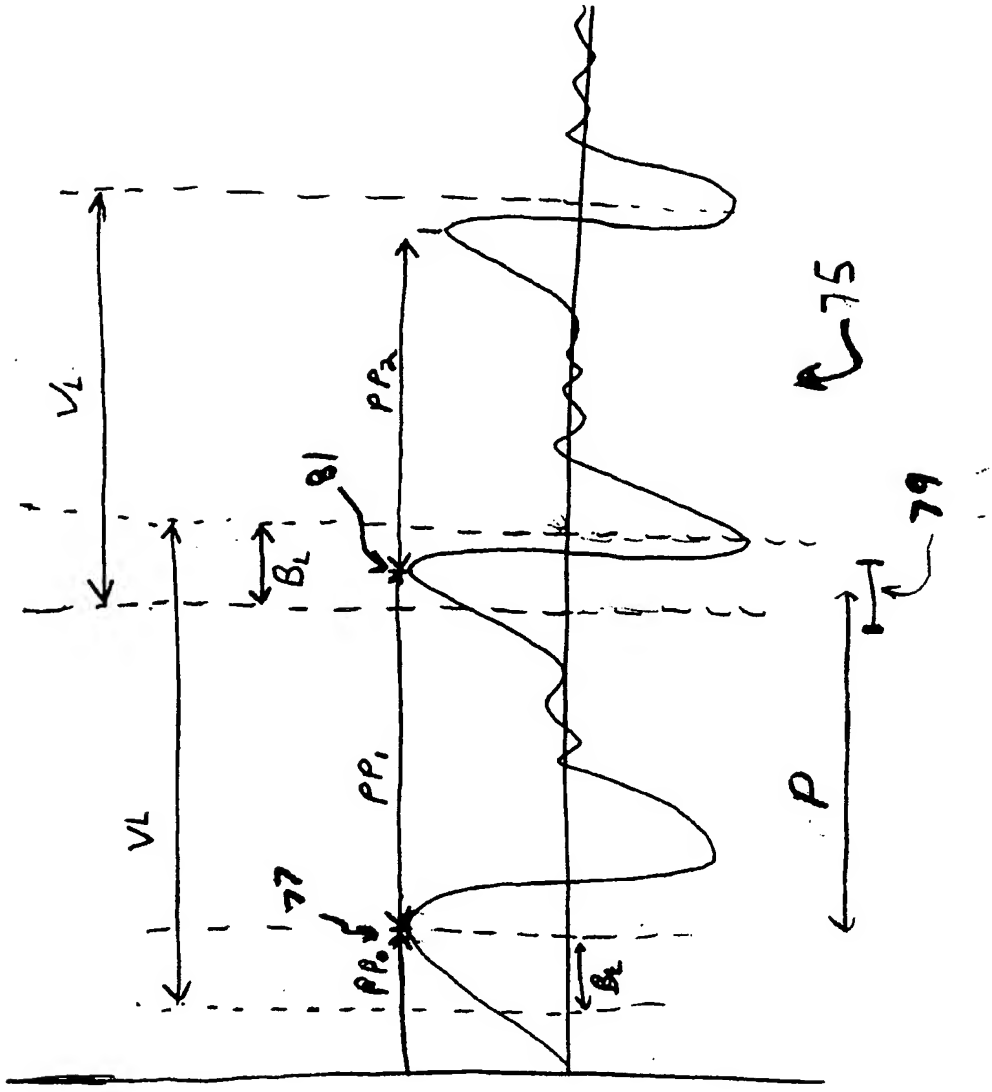
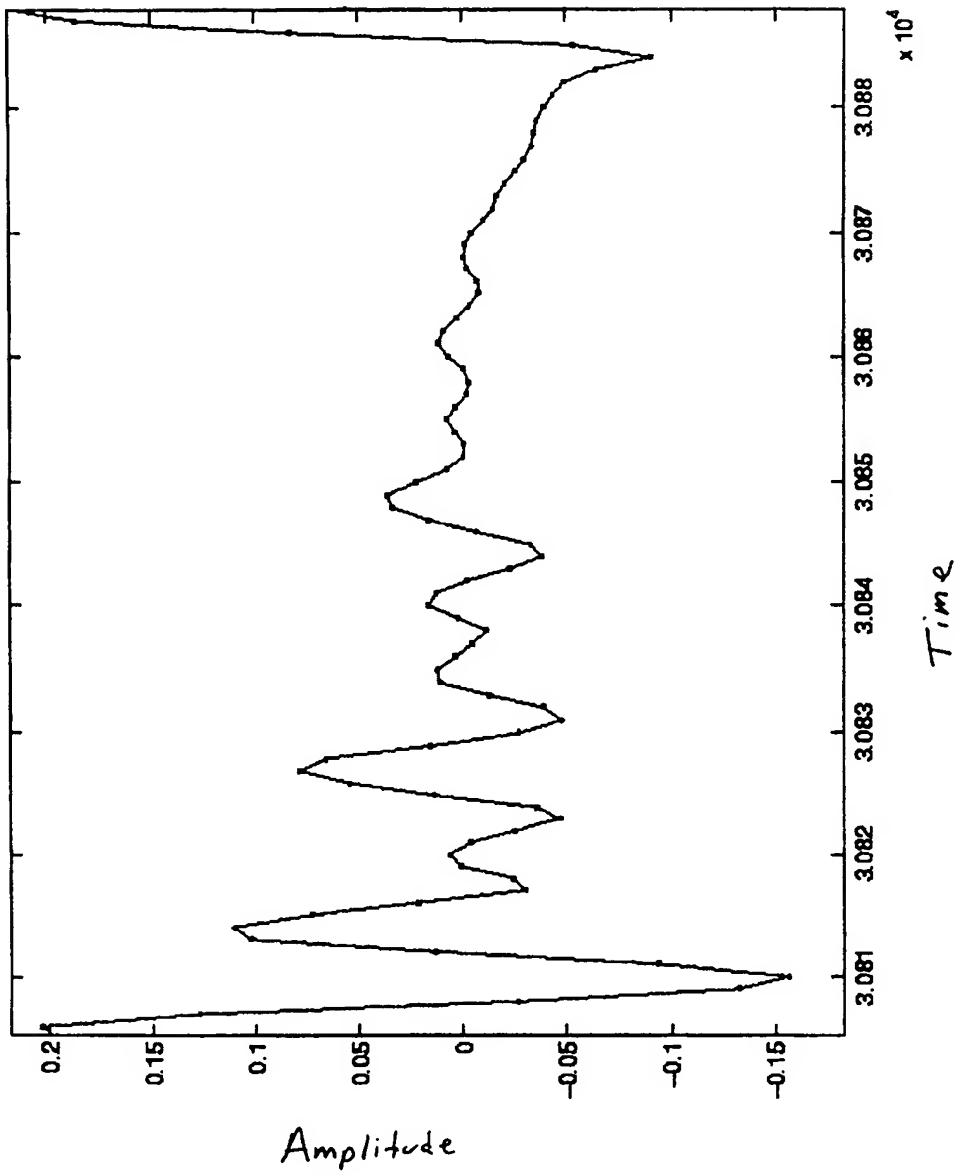


FIG. 4

FIG. 5


0.2
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
Amplitude
3.081
3.082
3.083
3.084
3.085
3.086
3.087
3.088
x 10^4
Time

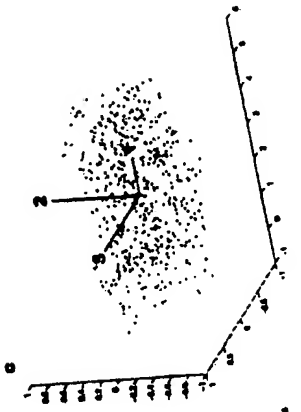


FIG. 6C

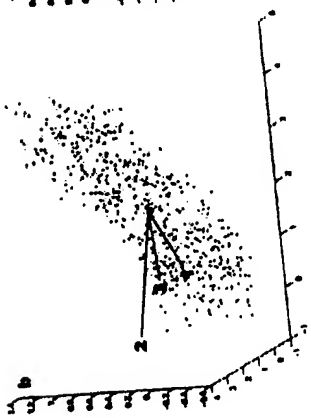


FIG. 6B

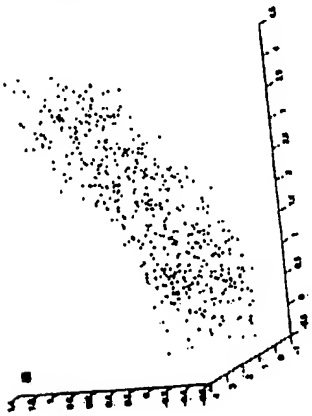


FIG. 6A

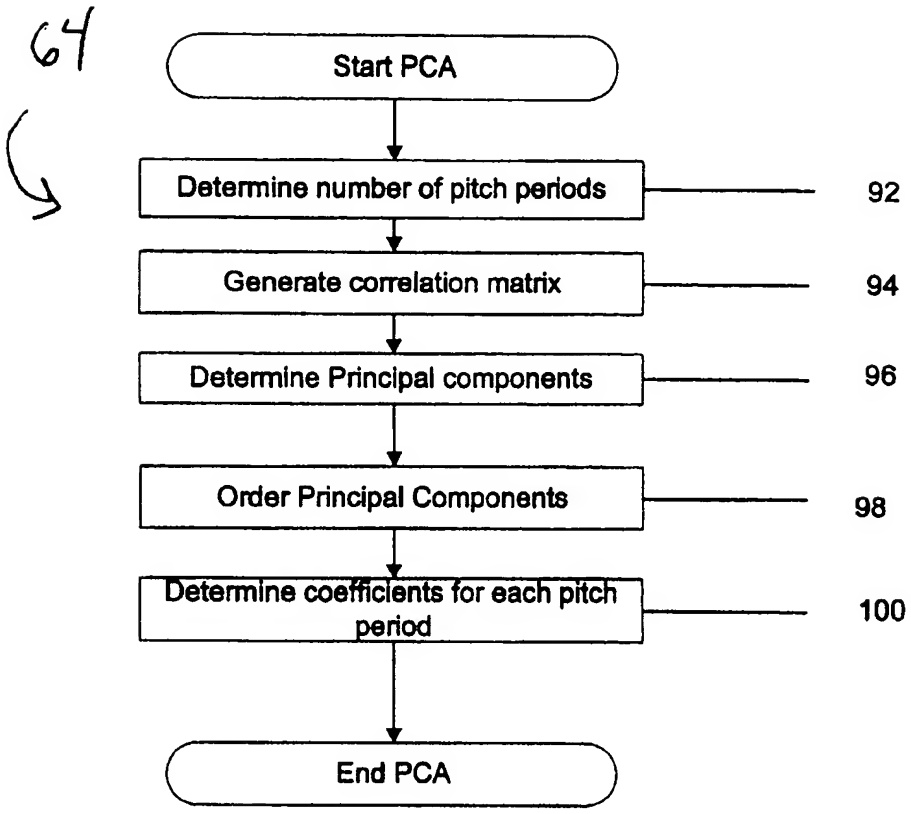

64
Start PCA
Determine number of pitch periods
92
Generate correlation matrix
94
Determine Principal components
96
Order Principal Components
98
Determine coefficients for each pitch period
100
End PCA

FIG. 7

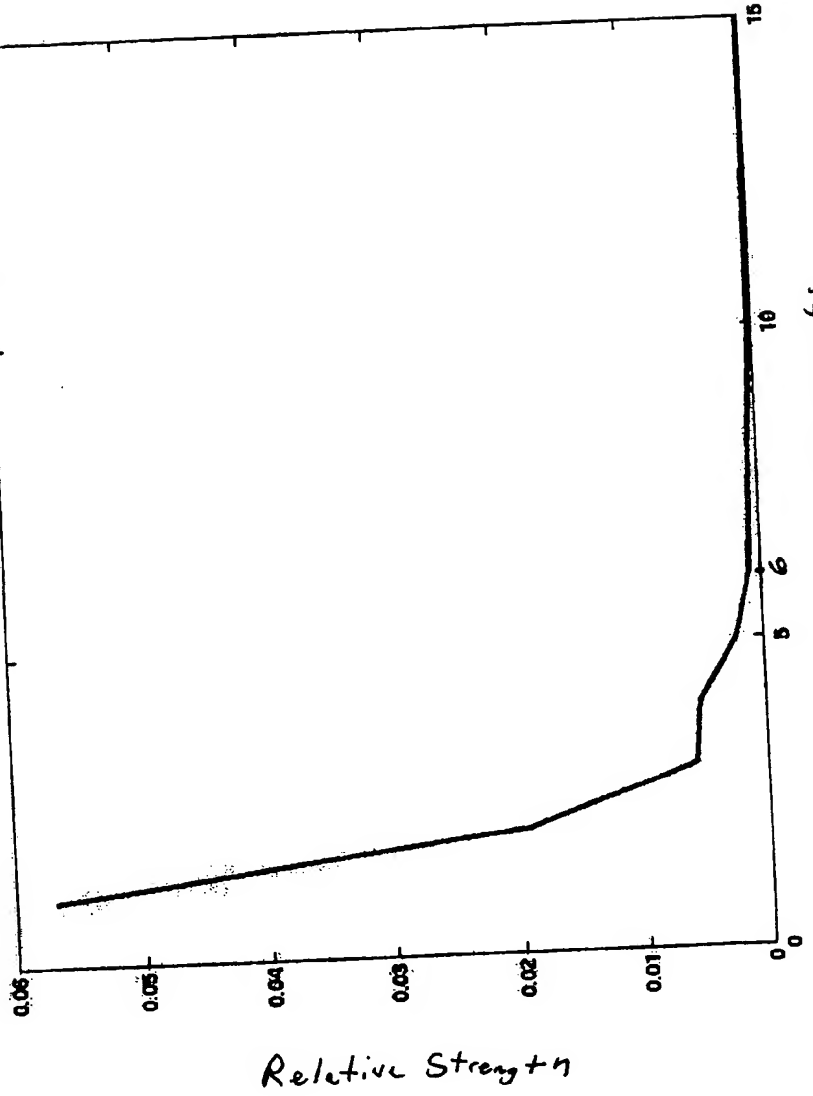

0.06
0.05
0.04
0.03
0.02
0.01
0
0
5
6
10
15
Relative Strength
Principal Components

FIG. 8

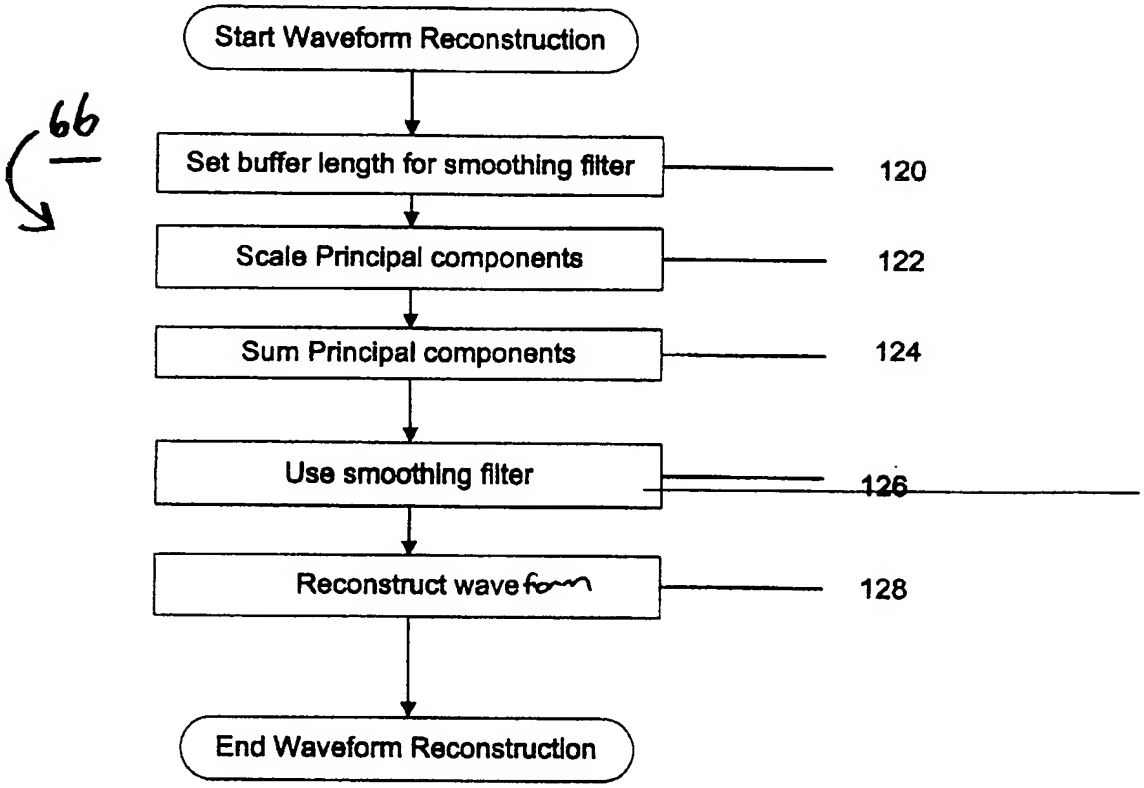

66
Start Waveform Reconstruction
Set buffer length for smoothing filter
120
Scale Principal components
122
Sum Principal components
124
Use smoothing filter
126
Reconstruct waveform
128
End Waveform Reconstruction

FIG. 9

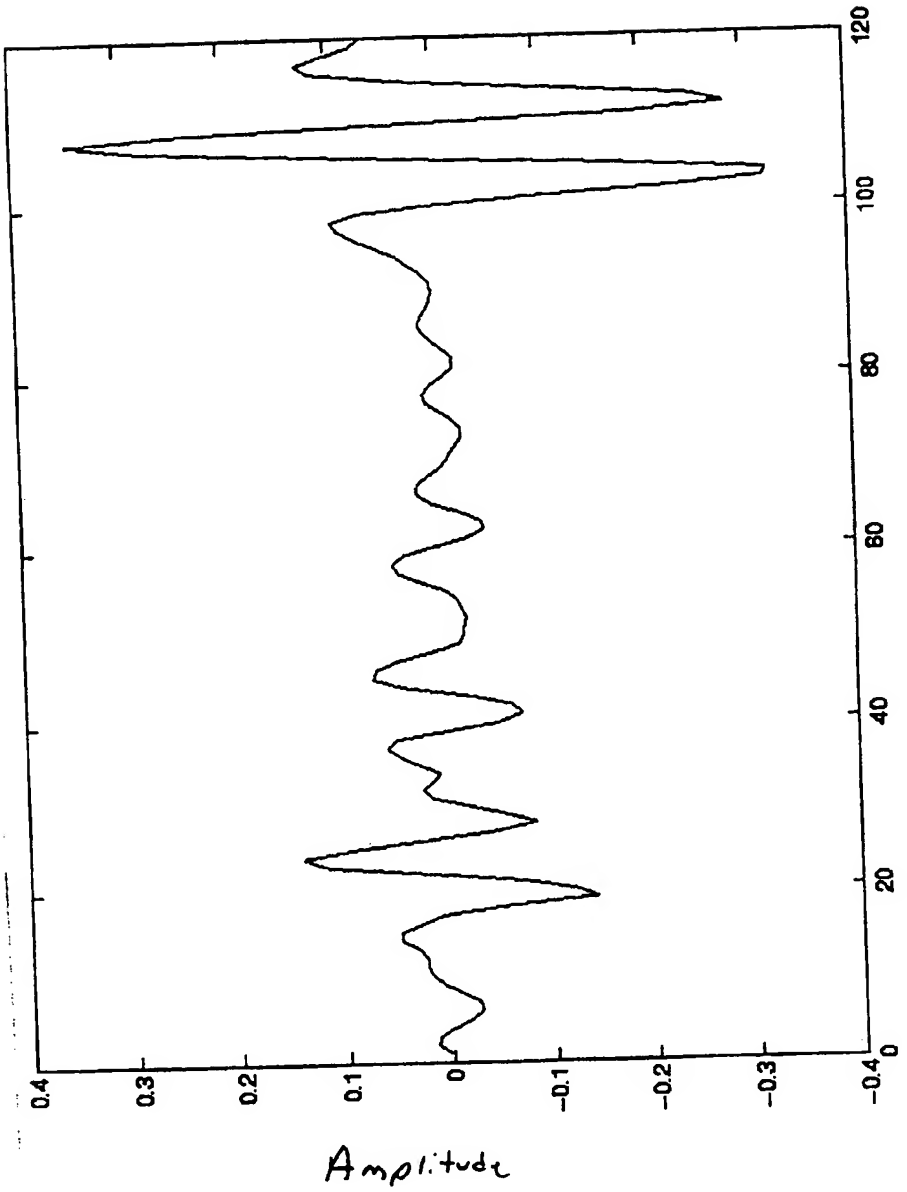


FIG. 10A

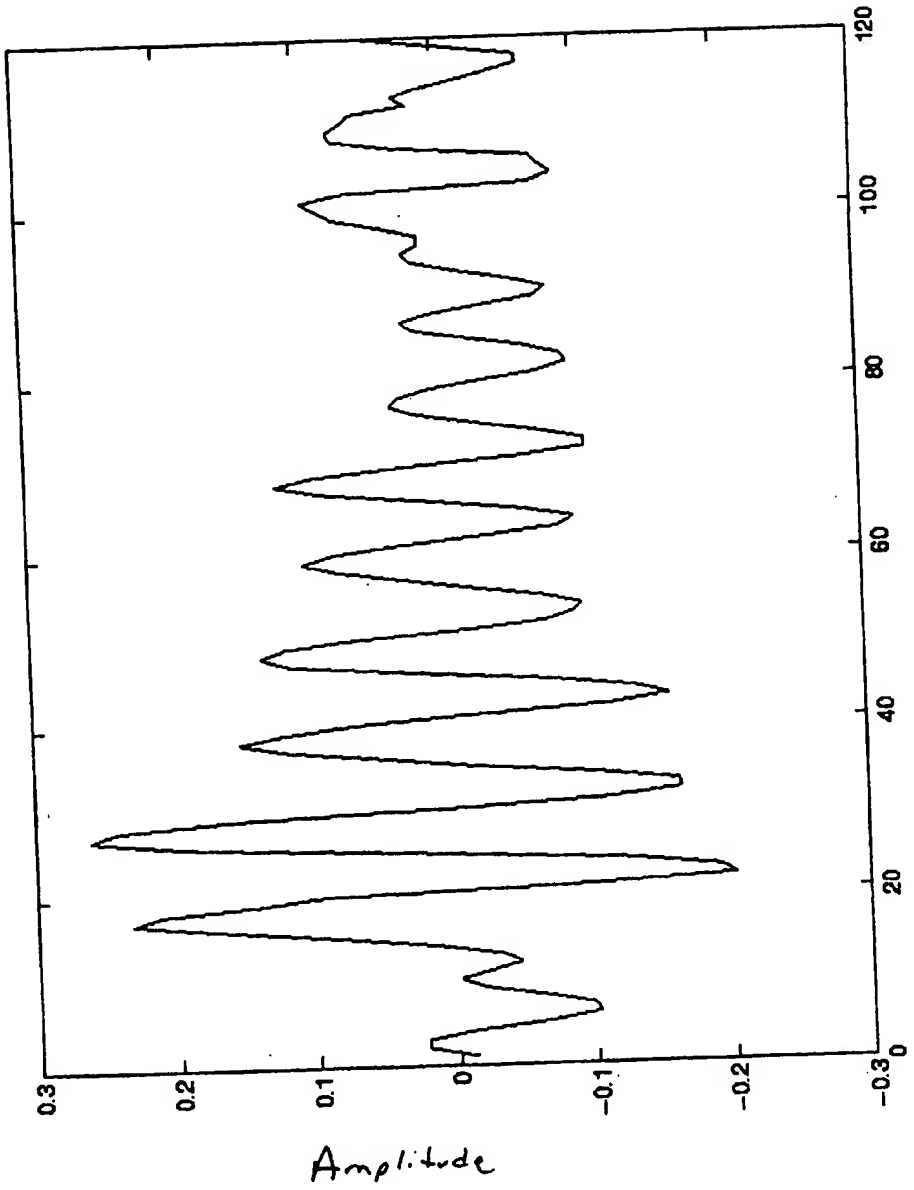


FIG 10B

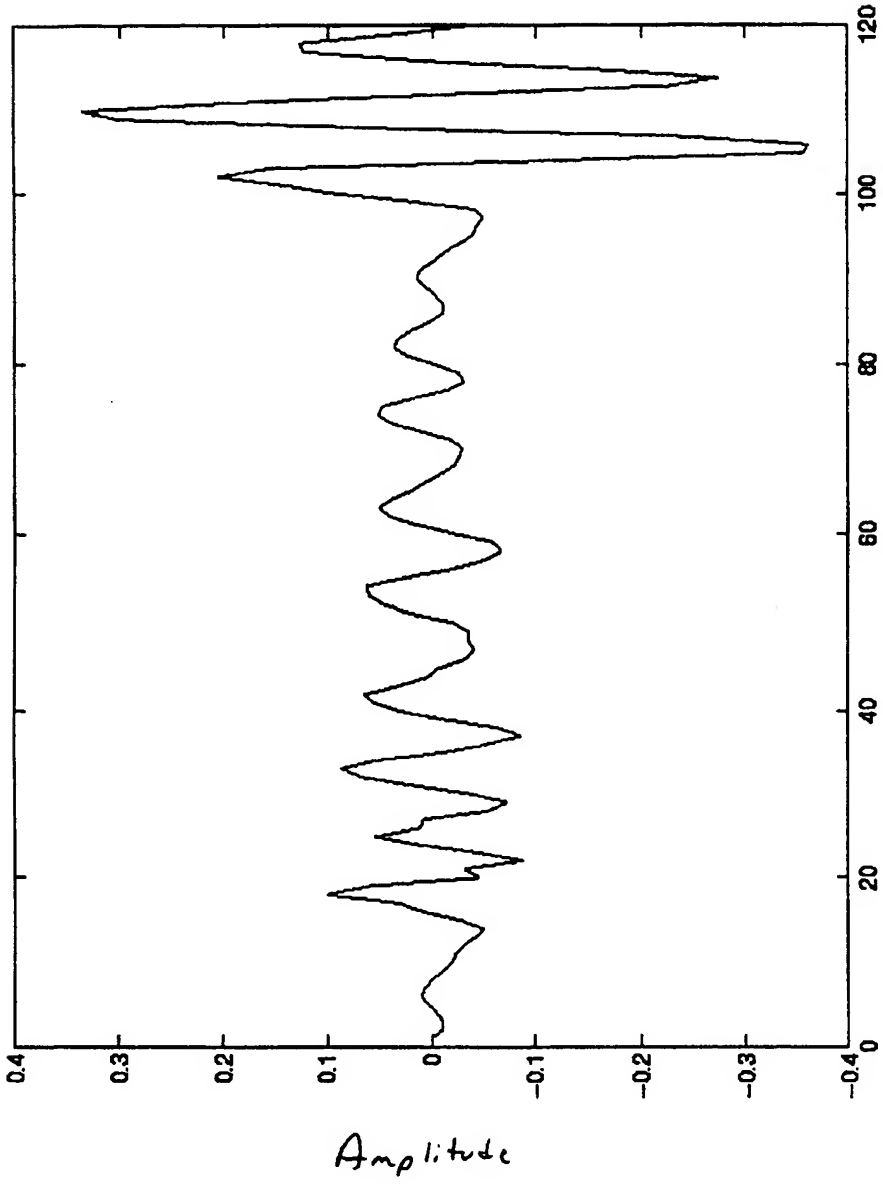


FIG. 10C

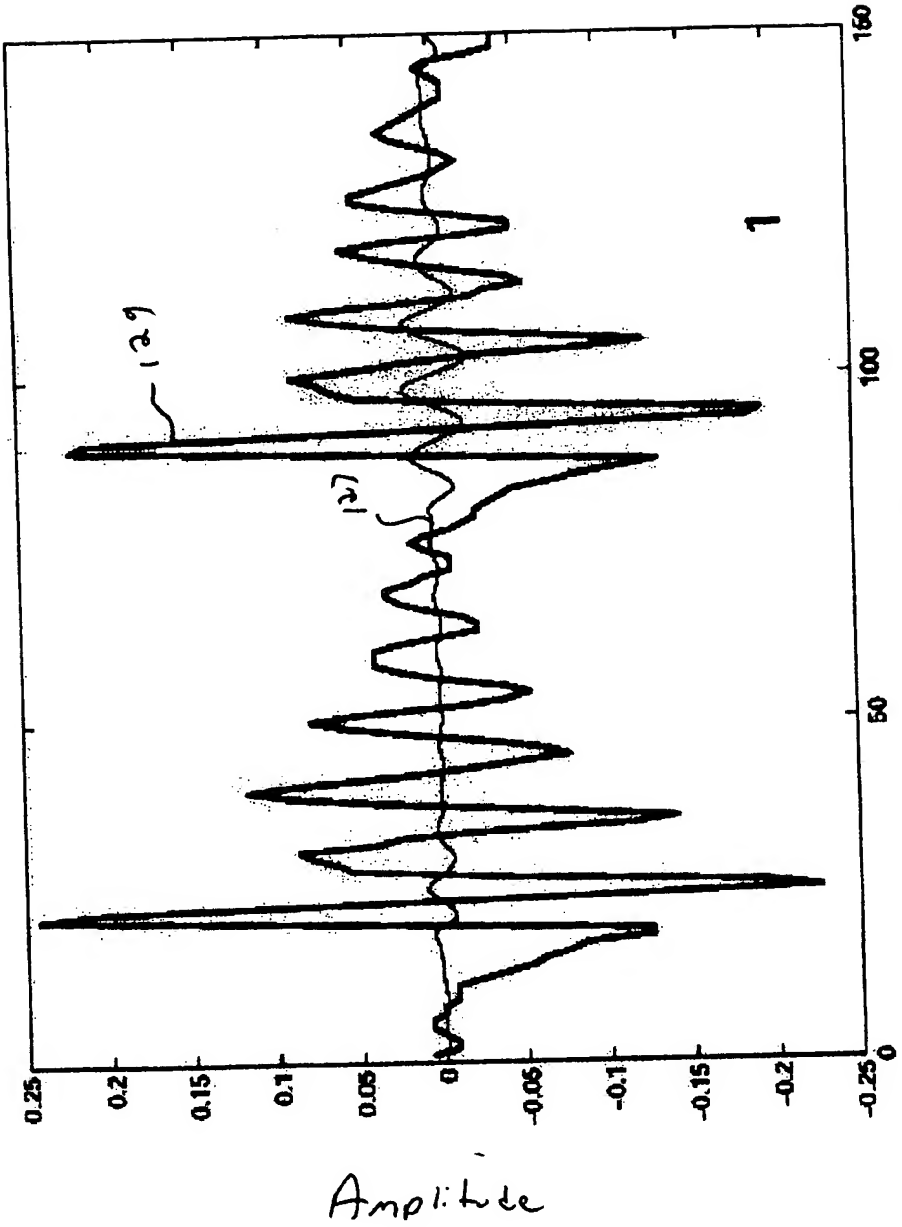

1
127
121
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Time
Amplitude

FIG. 11A

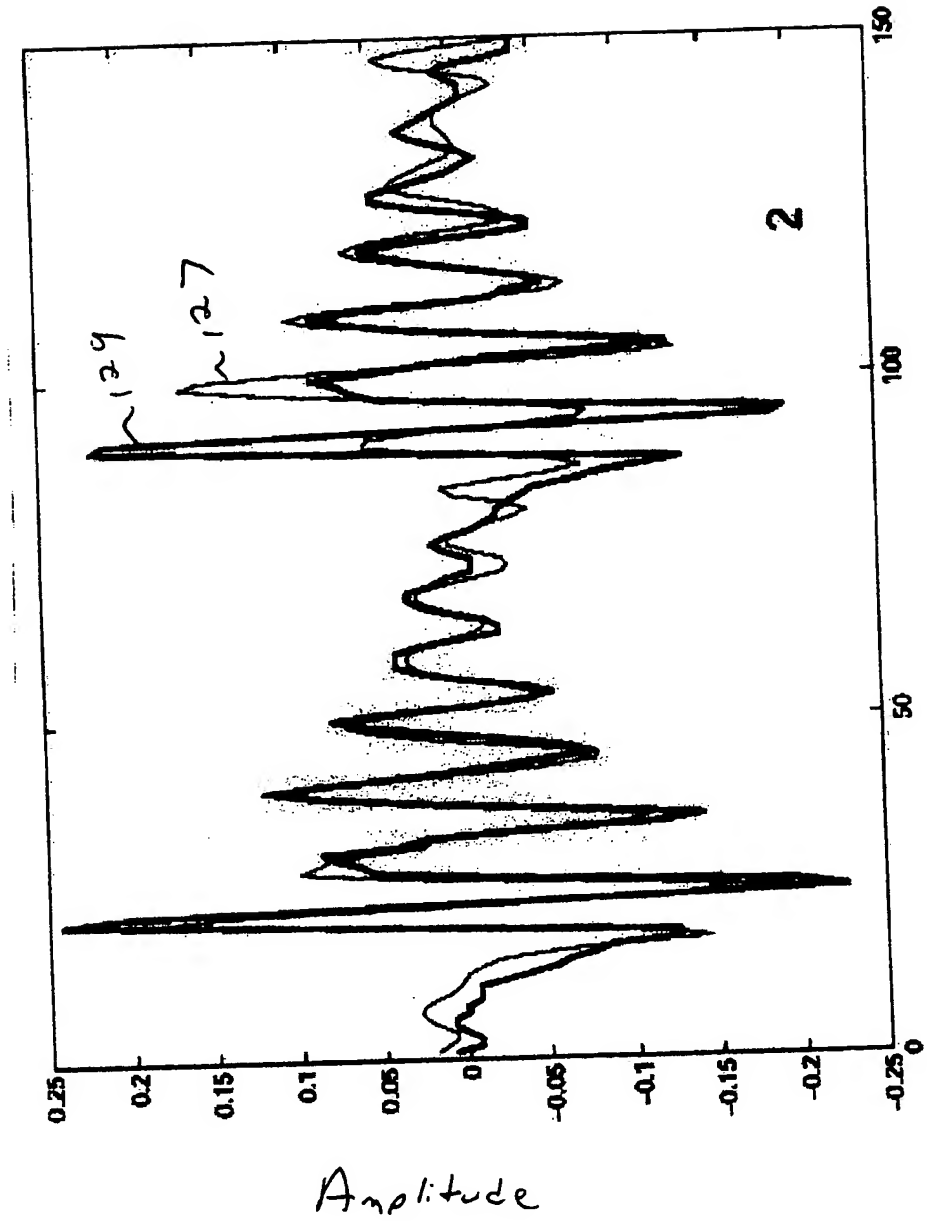

2
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Time
Amplitude

FIG. 11B

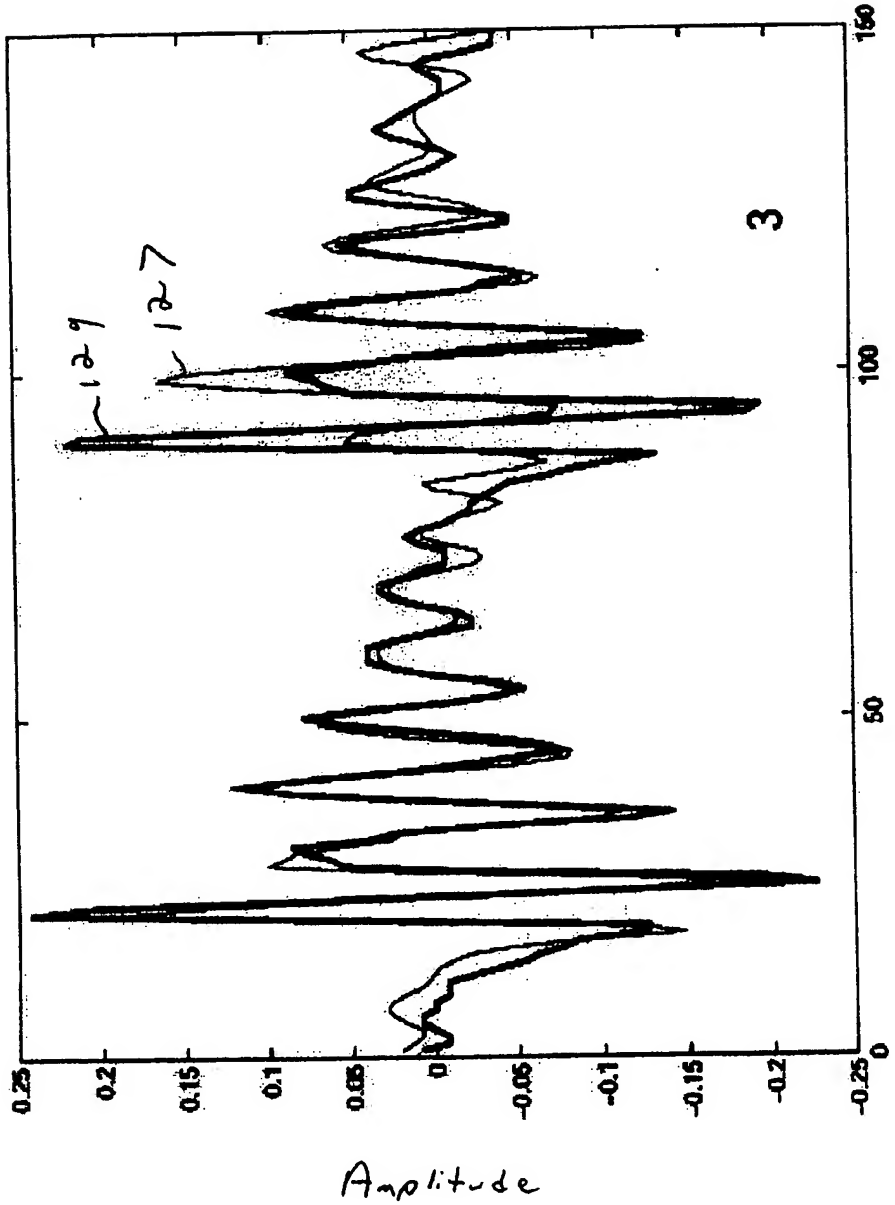

3
127
127
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Time
Amplitude

FIG. 11C

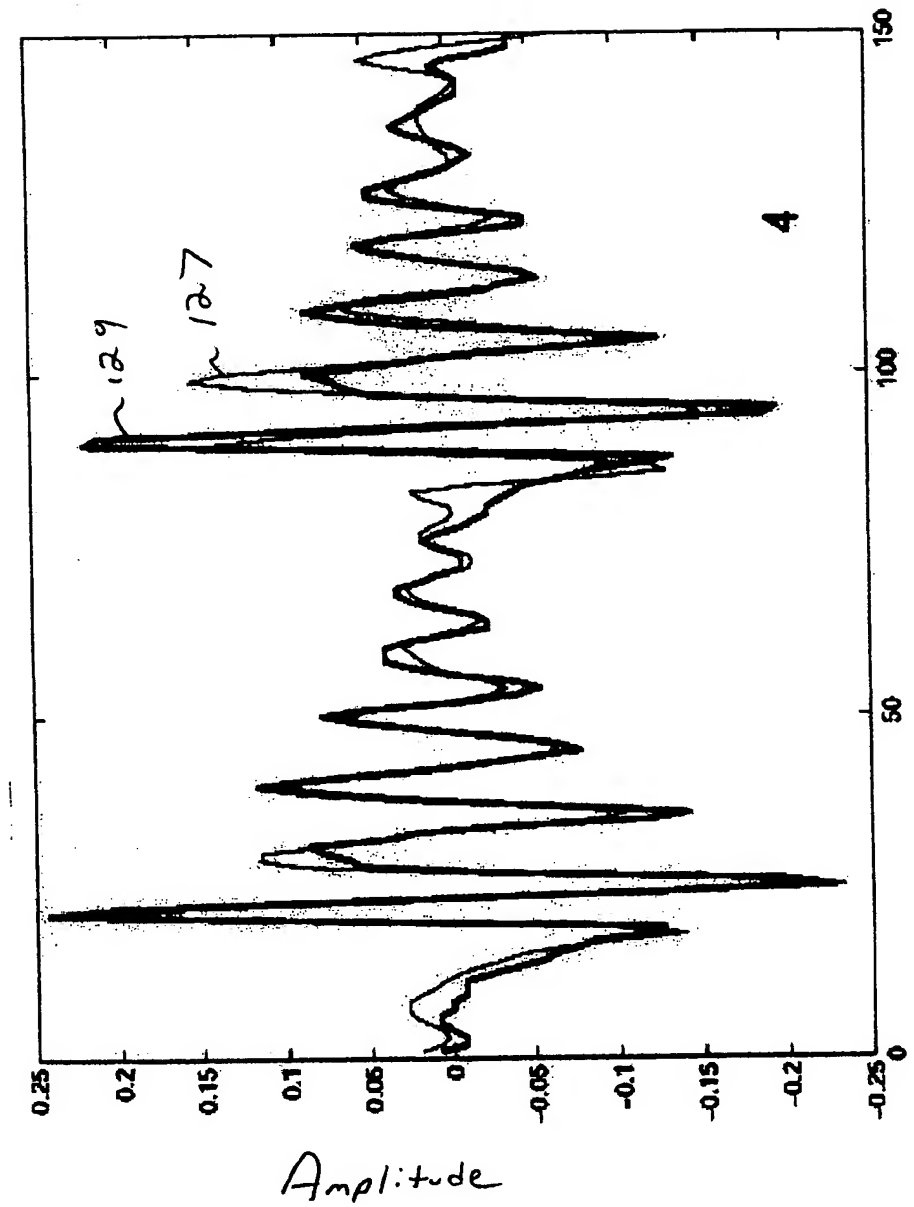

129
127
4
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Time
Amplitude

FIG 11D

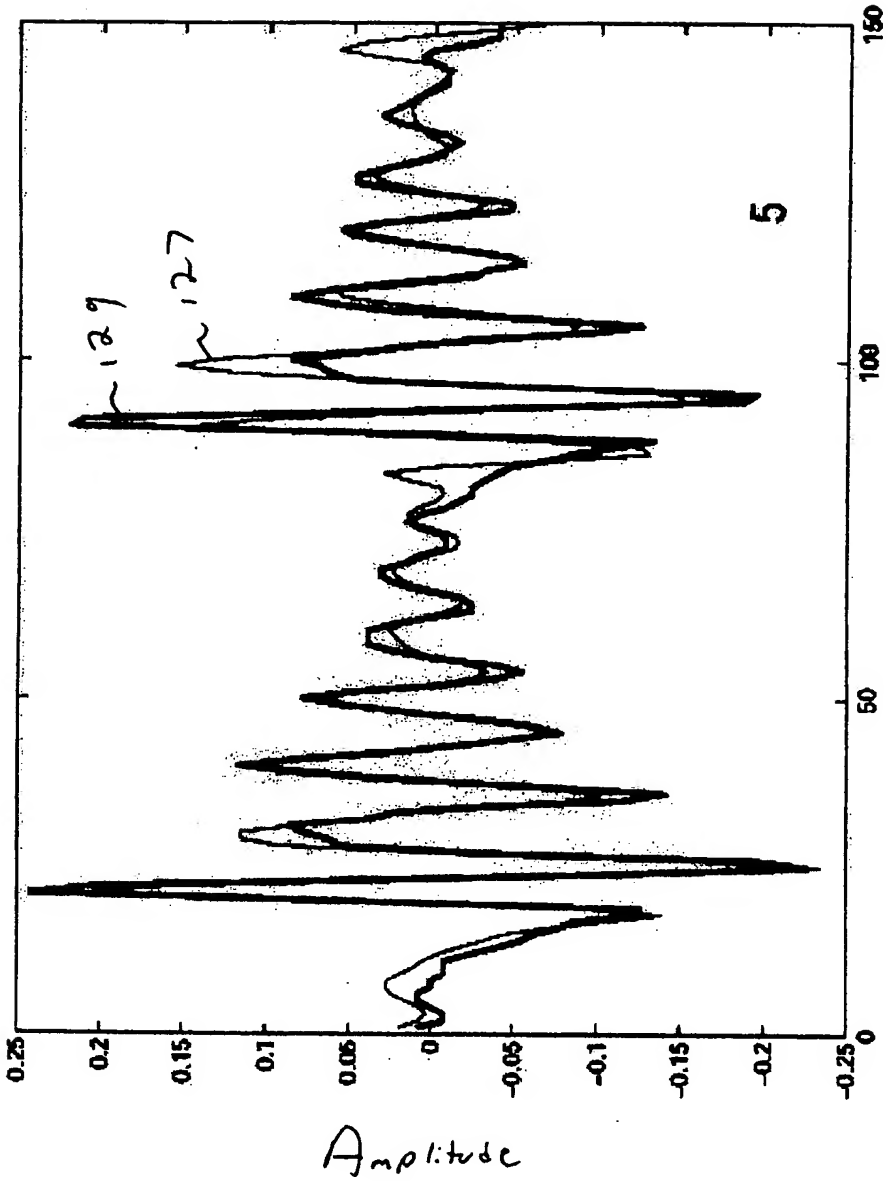

129
127
5
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Amplitude
Time

FIG. 11E

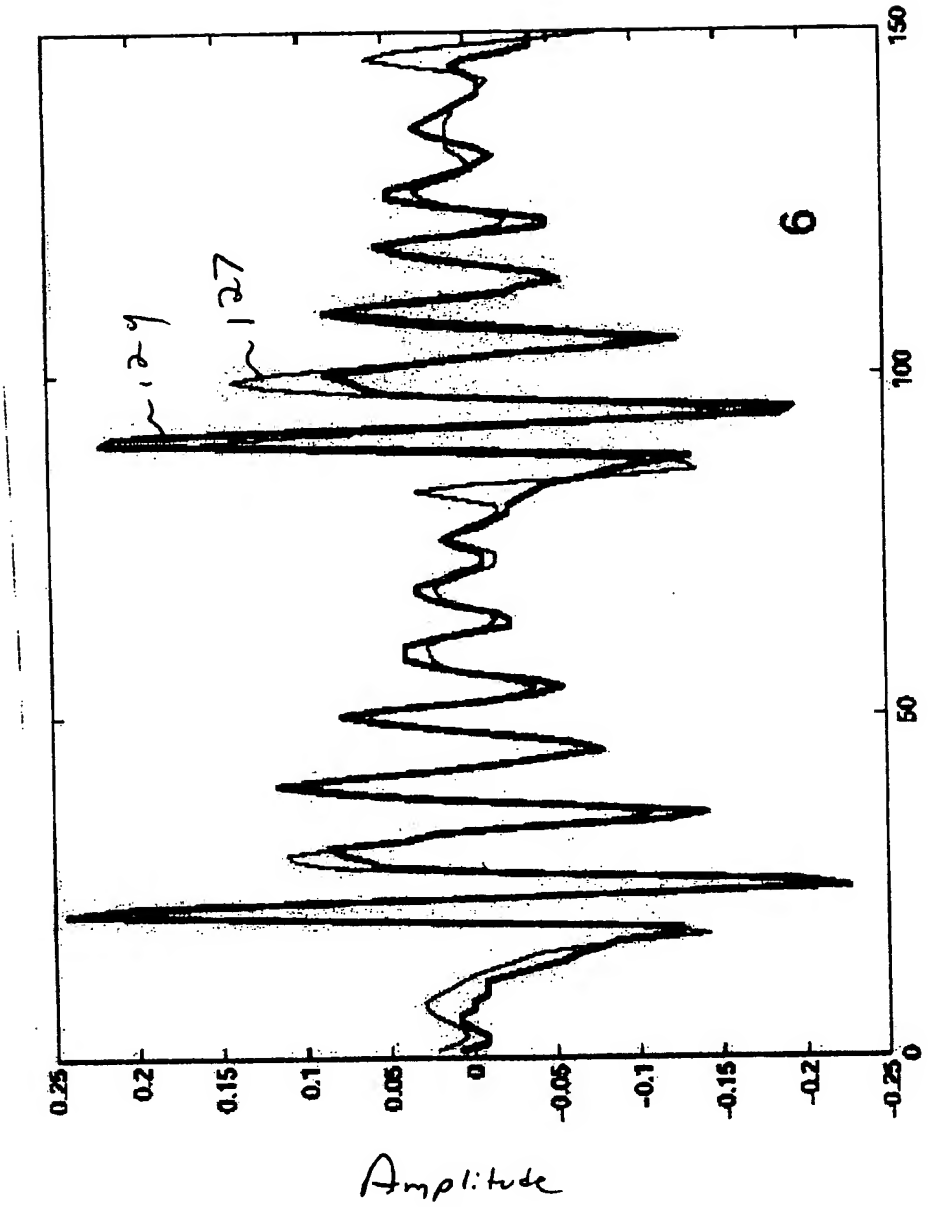

6
129
127
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
50
100
150
Amplitude
Time

FIG. 11F

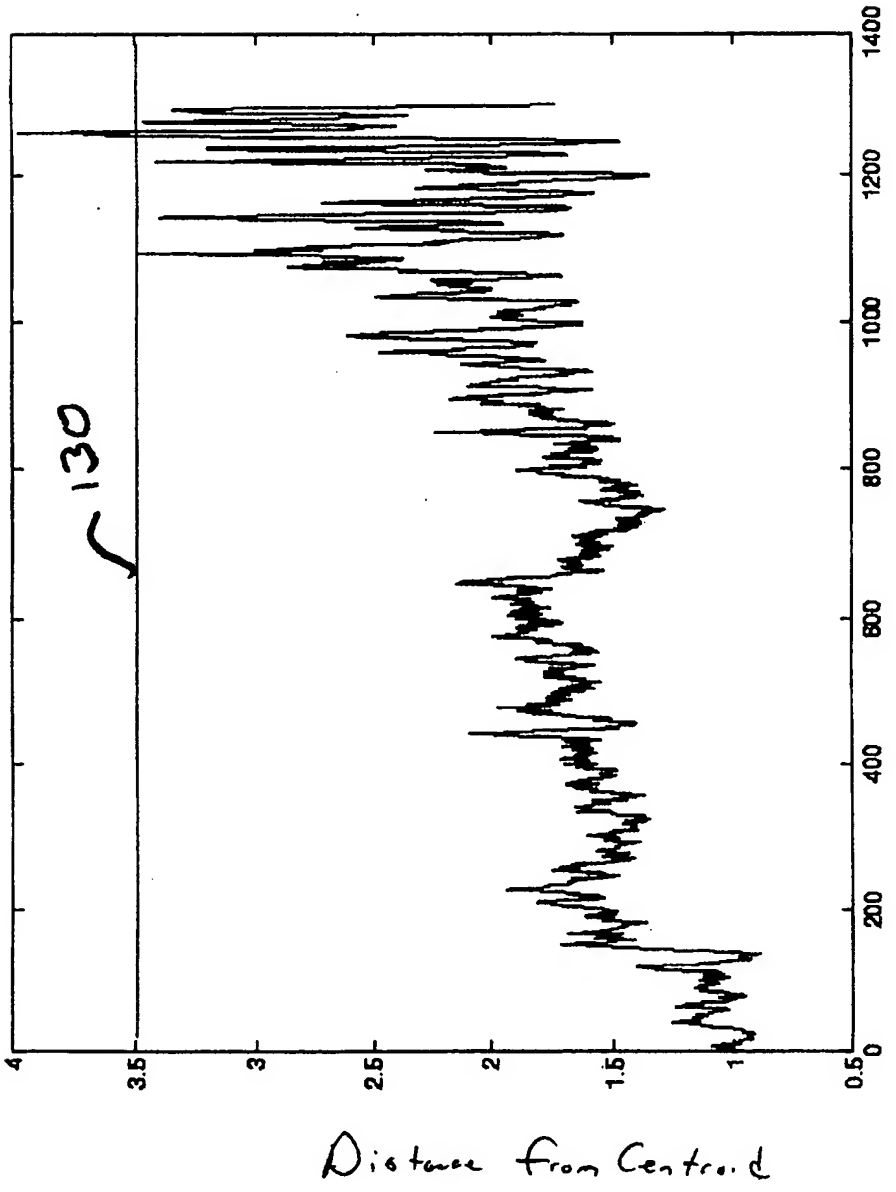

130
4
3.5
3
2.5
2
1.5
1
0.5
0
200
400
600
800
1000
1200
1400
Distance from Centroid
Pitch Periods

FIG. 1A

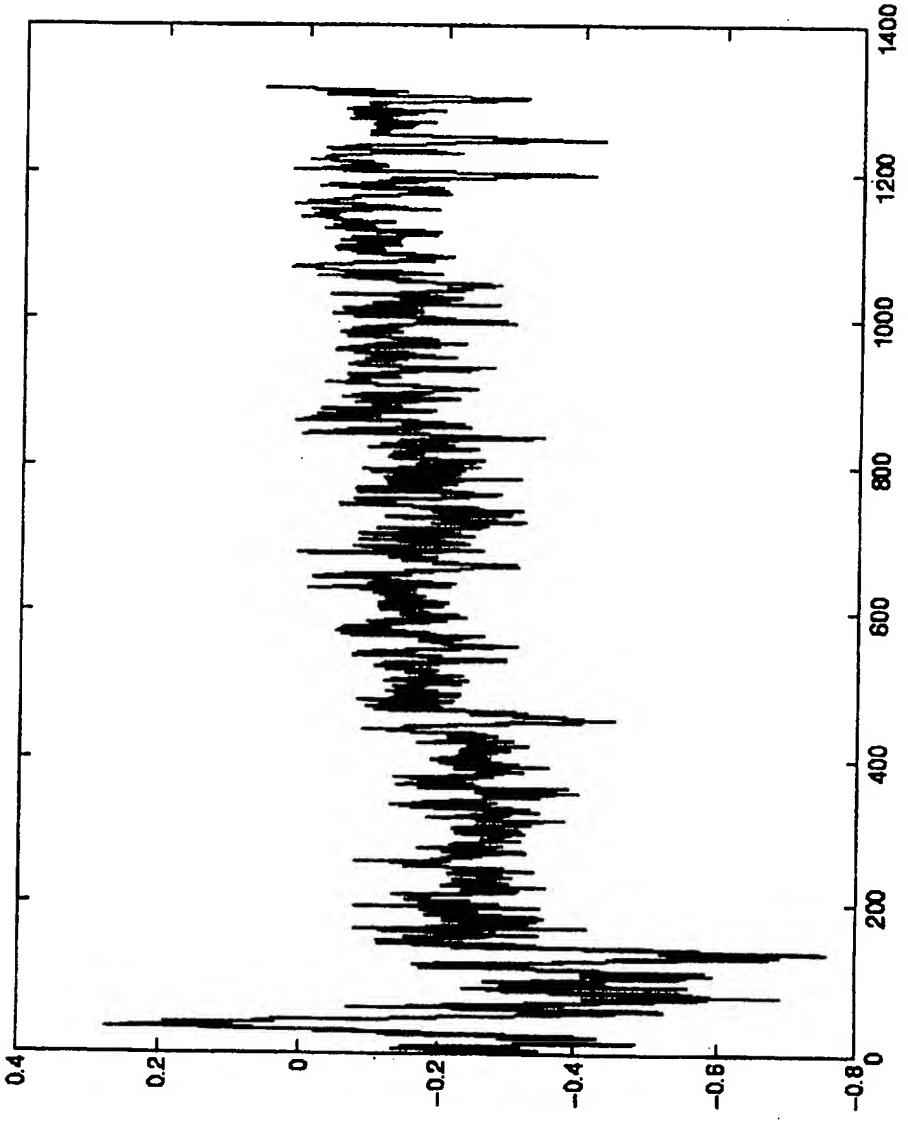


FIG. 13A

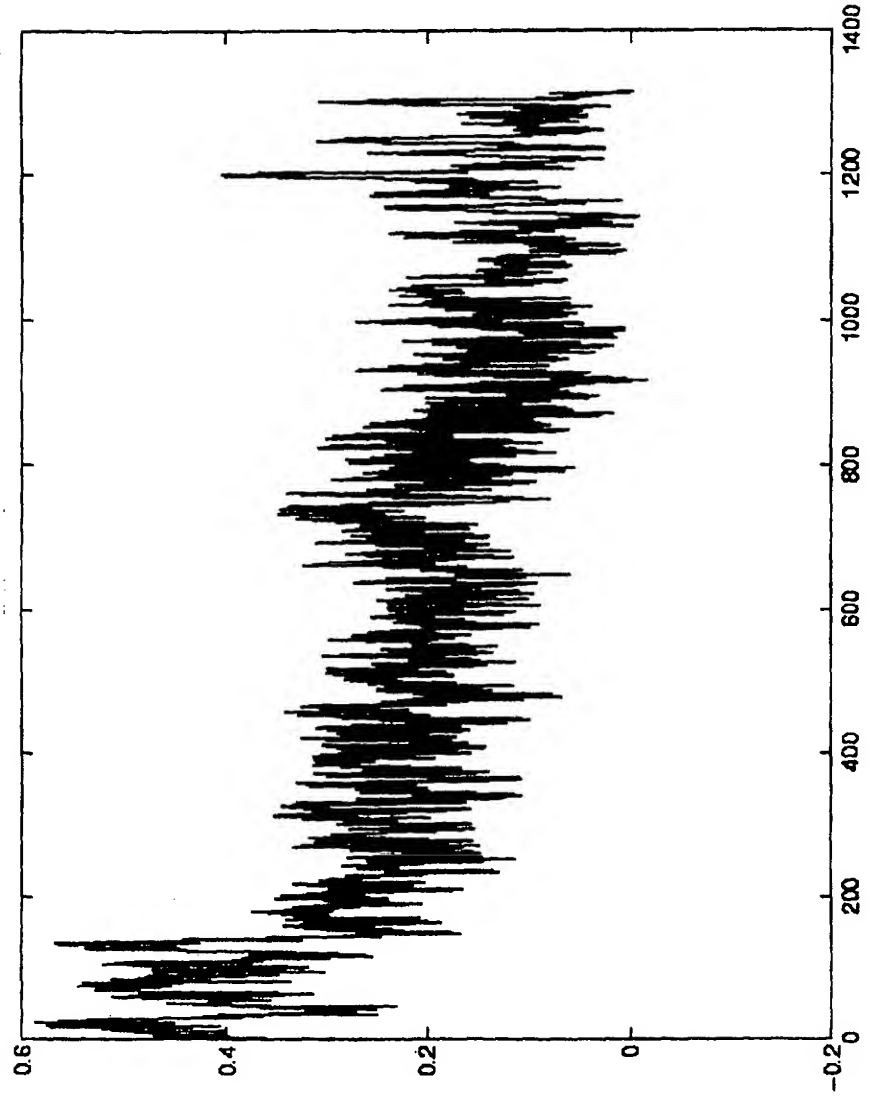


FIG 13

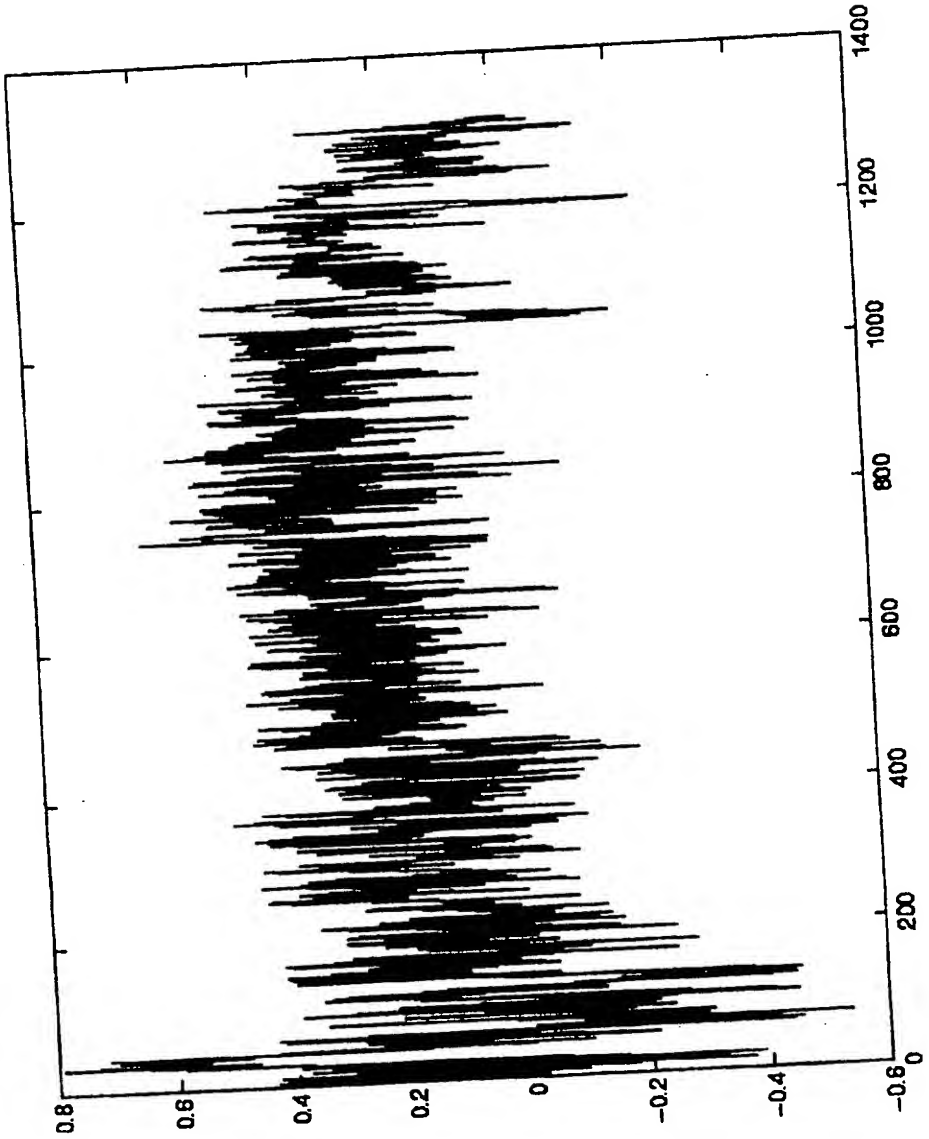


FIG. 13C

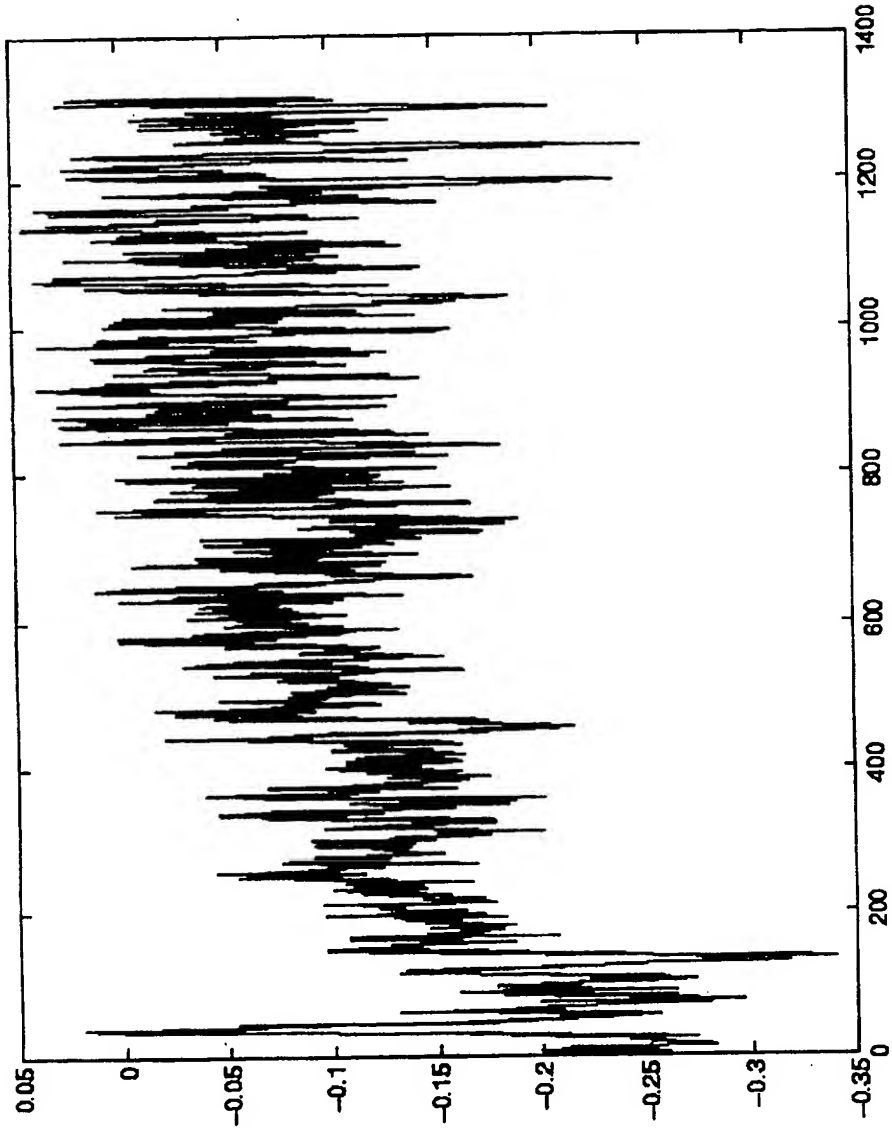


FIG. 13D

FIG. 14A

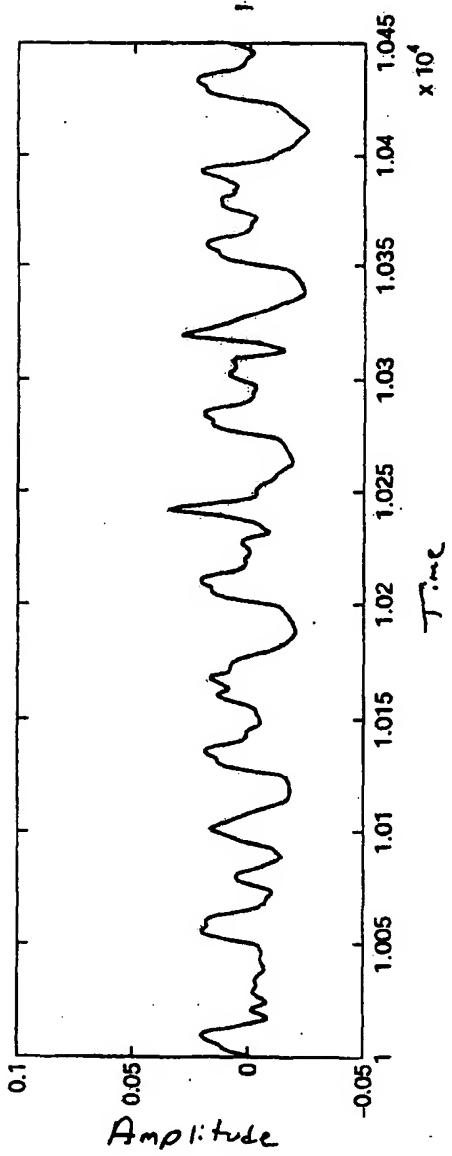
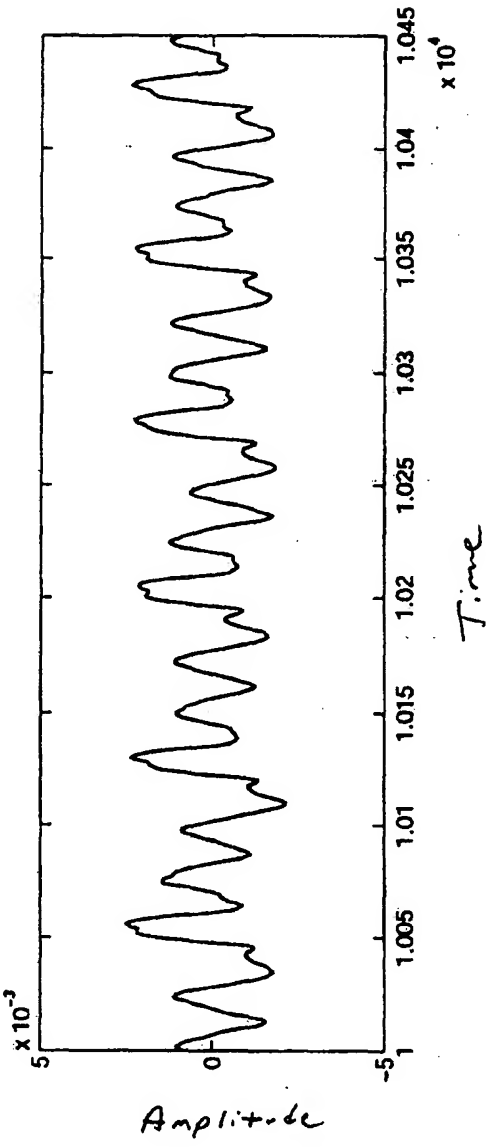


FIG. 14B



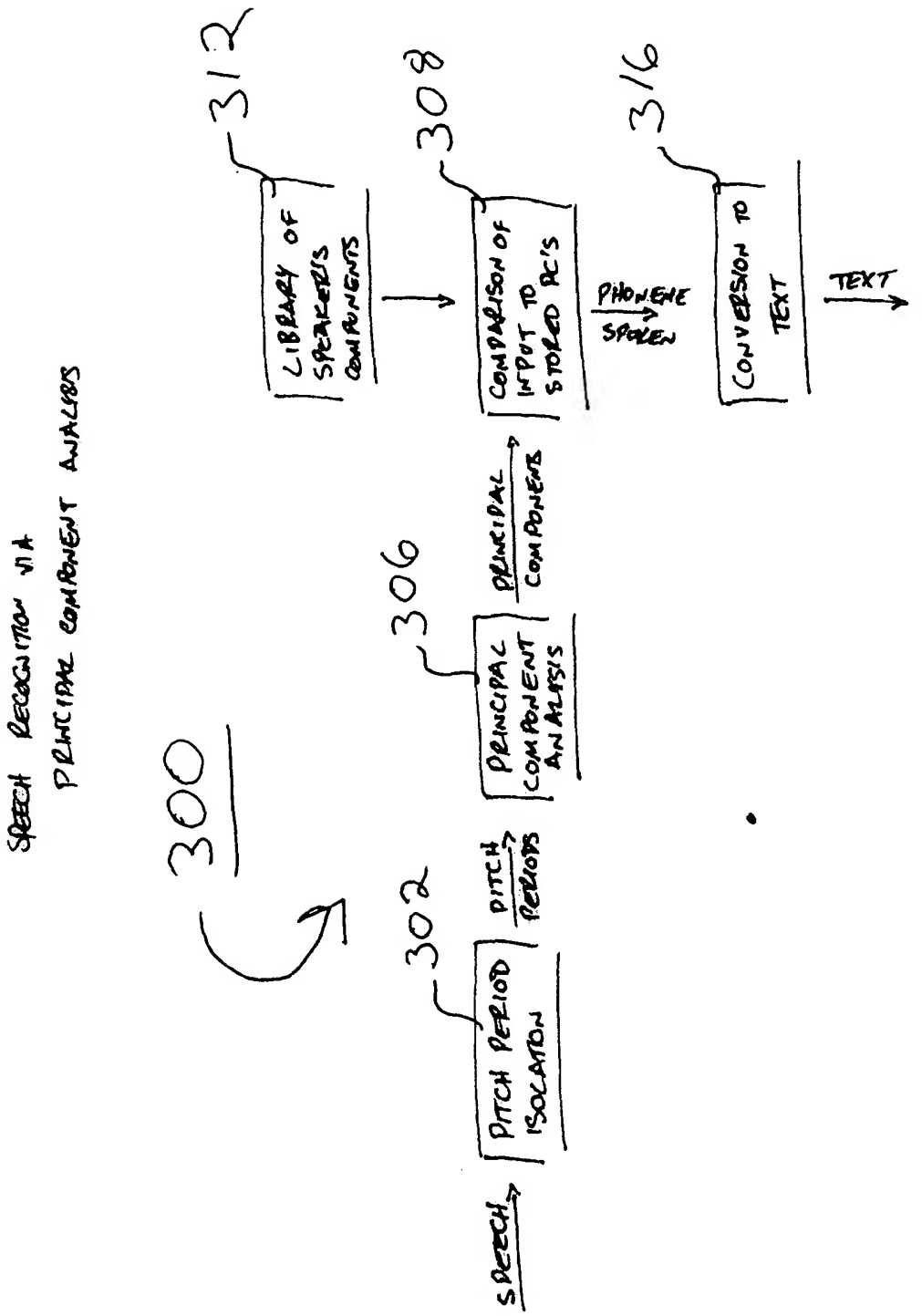

SPEECH RECOGNITION VIA
PRINCIPAL COMPONENT ANALYSIS
300
SPEECH
302
PITCH PERIOD ISOLATION
PITCH PERIODS
306
PRINCIPAL COMPONENT ANALYSIS
PRINCIPAL COMPONENTS
312
LIBRARY OF SPEAKER'S COMPONENTS
308
COMPARISON OF INPUT TO STORED PC'S
PHONEME SPOKEN
316
CONVERSION TO TEXT
TEXT

FIG. 15

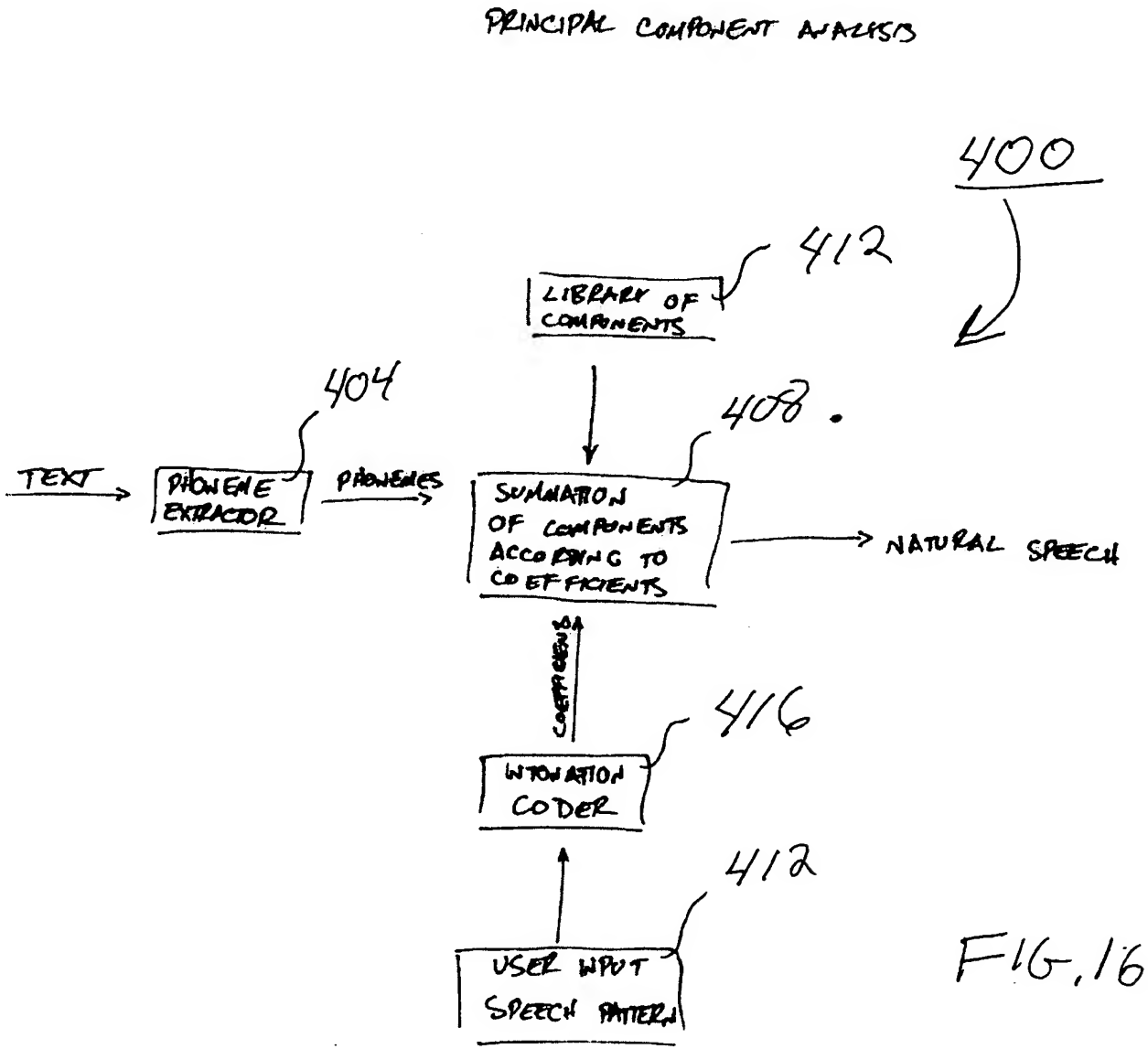

SPEECH SYNTHESIS VIA
PRINCIPAL COMPONENT ANALYSIS
400
412
LIBRARY OF COMPONENTS
404
408
TEXT
PHONEME EXTRACTOR
PHONEMES
SUMMATION OF COMPONENTS ACCORDING TO COEFFICIENTS
NATURAL SPEECH
COEFFICIENTS
416
INTONATION CODER
412
USER INPUT SPEECH PATTERN

FIG. 16

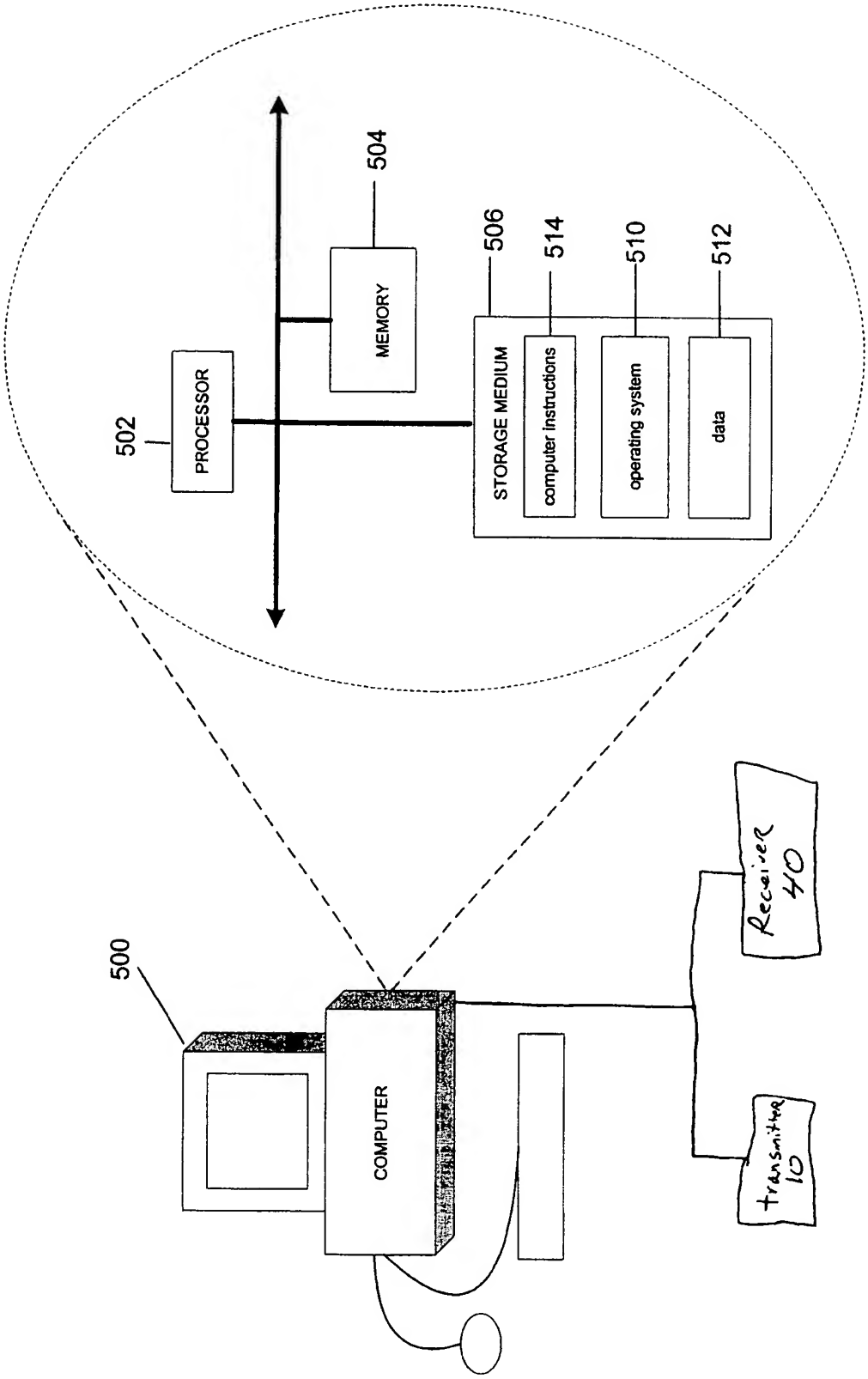

500
COMPUTER
502
PROCESSOR
504
MEMORY
506
STORAGE MEDIUM
514
computer instructions
510
operating system
512
data
Receiver 40
transmitter 10

FIG. 17